[0071] What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. An ultimate analyzer comprising:

a scattered electron beam detector for detecting an electron beam scattered by an object to be analyzed;

an electron spectrometer for energy dispersing an electron beam transmitted through said object to be analyzed;

an electron beam detector for detecting said dispersed electron beam; and

a control unit for analyzing elements of said object to be analyzed based on a computed output signal obtained either through adding or subtracting operation applied between an output signal, or a calculation result obtained based on said output signal, of the electron beam detected by said electron beam detector and an output signal of the scattered electron beam detected by said scattered electron beam detector or through dividing operation applied to said output signal or said calculation result of said electron beam using the square root of said output signal of said scattered electron beam as the divisor.

2. An ultimate analyzer comprising:

a scattered electron beam detector for detecting an electron beam scattered by an object to be analyzed;

an electron spectrometer for energy dispersing an electron beam transmitted through said object to be analyzed;

an electron beam detector for detecting said dispersed electron beam;

an image display unit for displaying an element distribution image of said object to be analyzed obtained through computation based on an output signal of the electron beam detected by said electron beam detector and an element distribution image of said

object to be analyzed obtained through computation based on an output signal of the electron beam detected by said scattered electron beam detector; and

a computing unit either for adding or subtracting operation between the intensity of said transmission electron beam, or a calculation result obtained based on said intensity, and the intensity of said scattered electron beam or for dividing operation to said intensity of transmission electron beam, or said calculation result, using the square root of said intensity of scattered electron beam as the divisor.

3. An ultimate analyzer comprising:

a scattered electron beam detector for detecting an electron beam scattered by an object to be analyzed;

an electron spectrometer for energy dispersing an electron beam transmitted through said object to be analyzed;

an electron beam detector for detecting said dispersed electron beam;

any one of an image display unit for displaying line profiles of an element of said object to be analyzed obtained from an analysis result output from a control unit for operating the element of said object to be analyzed based on an output signal of the electron beam detected by said electron beam detector and an analysis result output from said control unit for analyzing the element of said object to be analyzed based on an output signal of the electron beam detected by said scattered electron beam detector, and an image display for displaying a distribution image of said element, and an image display unit for displaying said distribution image of said element and a distribution image of said element based on the output signal of the electron beam detected by said scattered electron beam detector at a time with two image planes side-by-side or sequentially one-image planes or overlapping two image planes with each other; and

a computing unit either for adding or subtracting operation between the intensity of said transmission electron beam, or a calculation result obtained based on said intensity, and the intensity of said scattered electron beam or for dividing operation to said

intensity of transmission electron beam, or said calculation result, using the square root of said intensity of scattered electron beam as the divisor.

4. An ultimate analyzer according to any one of claims 1 to 3, which comprises an accelerator for accelerating the electron beam transmitted through said object to be analyzed, wherein said control unit controls said accelerator so that said transmitted electron beam corresponding to the element of said object to be analyzed may be incident to a fixed position of said electron beam detector, and executes operation processing for analyzing the element of said object to be analyzed based on output signals of the electron beam in a plurality of energy ranges detected by said electron beam detector.

5. An ultimate analyzer according to any one of claims 1 to 3, wherein said control unit comprises a memory part for pre-storing a value of acceleration voltage for accelerating said transmitted electron beam and an energy range of said transmitted electron beam for detecting the element of said object to be analyzed; and an operation part for operating analysis of the element of said object to be analyzed based on an output signal of the electron beam in said pre-stored energy range, or an intensity of said electron beam and the output signal of the electron beam detected by said scattered electron beam detector.

6. An ultimate analyzer according to any one of claims 1 to 3, which analyzes the element of said object to be analyzed based on output signals of the electron beam within a plurality of energy ranges among intensities of said transmission electron beam detected by said electron beam detector or based on the output signal of said electron beam and the output signal of the electron beam detected by the scattered electron beam detector, and comprises any one of an image display unit for displaying a line profile of an element of said object to be analyzed based on the output signal of said electron beam relating to said analyzed element and an electron beam irradiated position in said object to be analyzed; and an image display unit for displaying a distribution image of said element; and an image display unit for displaying said distribution image of said element and a distribution image of said element based on the output signal of the electron beam

detected by said scattered electron beam detector at a time with two image planes side-by-side or sequentially one-image planes or overlapping two image planes with each other.

7. An ultimate analyzer according to any one of claims 1 to 3, wherein said memory part stores correcting data for removing an individual influence specific to said electron beam detector for detecting said transmitted electron beam, and said operating part corrects the output signal of said detected electron beam based on said correcting data.

8. An ultimate analyzer according to any one of claims 1 to 3, wherein a first energy range of an energy range including a core-loss edge expressed by said transmitted electron energy loss spectrum relating to the element of said object to be analyzed and a second energy range of an energy range higher than the core loss energy are pre-stored in said memory part, said control unit controls so as to an output signal of a first electron beam detected by an electron beam detecting portion corresponding to said first energy range and an output signal of a second electron beam detected by an electron beam detecting portion corresponding to said second energy range based on said first energy range and said second energy range, and said operating part execute operation processing of the output signal of said first electron beam and the output signal of said second electron beam, and executes operation processing of analyzing the element of said object to be analyzed based on relationship between said operation processed result and the output signal of the electron beam detected by said scattered electron beam detector.

9. An ultimate analyzer according to claim 8, which comprises an image display unit for displaying said operation processed result or an operation processed result based on relationship between said operation processed result and the output signal of the electron beam detected by said scattered electron beam detector; and the result based on the output signal of the electron beam detected by said scattered electron beam detector at a time with two image planes side-by-side or sequentially one-image planes or overlapping two image planes with each other.

10. An ultimate analyzer according to any one of claims 1 to 3, which comprises a plurality of said electron beam detectors for the transmitted electron beam or a plurality of said scattered electron beam detectors.

11. A scanning transmission electron microscope comprising an electron beam source; an electron beam scanning coil for scanning an electron beam emitted from said electron beam source; an upper objective lens for irradiating the emitted electron beam passed through said coil on a sample; a lower objective lens for condensing the electron beam coming out from said sample; a focusing lens for making the electron beam coming out from said lower objective lens into a virtual light source; a scattered electron detector for detecting a scattered electron beam among electron beams transmitted through the sample coming out from said focusing lens; a phase contrast detector for detecting a phase of an electron beam traveling straight among the electron beams coming out from said focusing lens; a focus adjusting electromagnetic lens for focusing the electron beam coming out from said phase contrast detector onto an electron spectrograph; a magnifying magnetic field lens for magnifying the electron beam coming out from said electron spectrograph; and an electron beam detector for detecting the electron beam coming out from said magnifying magnetic field lens, which further comprises an ultimate analyzer for analyzing elements of said sample.

12. A scanning transmission electron microscope, comprising an electron beam source; an electron beam scanning coil for scanning an electron beam emitted from said electron beam source; an upper objective lens for irradiating the emitted electron beam passed through said coil on a sample; a lower objective lens for condensing the electron beam coming out from said sample; a focusing lens for making the electron beam coming out from said lower objective lens into a virtual light source; a scattered electron detector for detecting a scattered electron beam among electron beams transmitted through the sample coming out from said focusing lens; a phase contrast detector for detecting a phase of an electron beam traveling straight among the electron beams coming out from said focusing lens; a focus adjusting electromagnetic lens for focusing the electron beam coming out from said phase contrast detector onto an electron spectrograph; a magnifying

magnetic field lens for magnifying the electron beam coming out from said electron spectrograph; and an electron beam detector for detecting the electron beam coming out from said magnifying magnetic field lens, which further comprises an ultimate analyzer for analyzing elements of said sample, wherein said ultimate analyzer is one of the ultimate analyzer according to claims 1 to 3.

13. An ultimate analysis method comprising the steps of detecting an electron beam transmitted through an object to be analyzed; and analyzing an element of said object to be analyzed based on an output signal of the detected electron beam,

wherein an intensity of said output signal is corrected by an output signal obtained either from adding or subtracting operation using the intensity of an electron beam scattered by said object to be analyzed or from dividing operation using the square root of the intensity of said scattered electron beam as the divisor.

14. An ultimate analysis method comprising the steps of

detecting an electron beam transmitted through an object to be analyzed;

detecting an element of said object to be analyzed based on an output signal of the detected electron beam; and

displaying an image of said ultimate analysis on a screen,

wherein the intensity of said electron beam or the result of calculation obtained based on said intensity of electron beam of said image of said ultimate analysis is corrected by an output signal obtained either from adding or subtracting operation using the intensity of an electron beam scattered by said object to be analyzed or from dividing operation using the square root of the intensity of said scattered electron beam as the divisor.

15. An ultimate analysis method,

wherein the intensity of an electron beam or the result of calculation obtained based on said intensity of an image of an ultimate analysis is corrected by an output signal

obtained either from adding or subtracting operation using the intensity of an electron beam scattered by an object to be analyzed or from dividing operation using the square root of the intensity of said scattered electron beam as the divisor,

said image of said ultimate analysis being obtained from an operation based on an energy range of core-loss edge expressed an electron energy loss spectrum due to inner-shell electron excitation by an electron beam transmitted through said object to be analyzed and an energy range just before said core-loss edge.

16. An ultimate analysis method of analyzing an element of an object to be analyzed based on an energy range of core-loss edge expressed in an electron energy loss spectrum due to inner-shell electron excitation by electrons transmitted through said object to be analyzed and an energy range just before said core-loss edge,

wherein the intensity of an electron beam or the result of calculation obtained based on said intensity in said analysis is corrected by an output signal obtained either from adding or subtracting operation using the intensity of an electron beam scattered by said object to be analyzed or from dividing operation using the square root of the intensity of said scattered electron beam as the divisor.

17. An ultimate analysis method, wherein an ultimate analysis image and a Z contrast image are displayed on a screen, said ultimate analysis image being obtained from an operation based on an energy range of core-loss edge expressed in an electron energy loss spectrum due to inner-shell electron excitation by electrons transmitted through said object to be analyzed and an energy range just before said core-loss edge, said Z-contrast image being obtained from operation based on an intensity of an electron beam scattered by said object to be analyzed.

18. An ultimate analysis method comprising the steps of detecting an electron beam transmitted through an object to be analyzed; analyzing an element of said object to be analyzed based on an output signal of the detected electron beam; and displaying an image of said ultimate analysis on a screen, wherein said image of said ultimate analysis is

displayed on the screen together with a Z-contrast image obtained from operation based on an intensity of an electron beam scattered by said object to be analyzed.

19. An ultimate analysis method comprising the steps of detecting an electron beam transmitted through an object to be analyzed; analyzing an element of said object to be analyzed based on an output signal of the detected electron beam; and displaying an image of said ultimate analysis on a screen,

wherein the intensity of said electron beam or the result of calculation obtained based on said intensity in said image of said ultimate analysis is displayed on the screen by being corrected either by adding or subtracting operation applied to the intensity of an electron beam or to the result of calculation obtained based on said intensity in a Z-contrast image obtained from operation based on an intensity of an electron beam scattered by said object to be analyzed or by dividing operation using the square root of said output signal as the divisor.